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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
CHOU, ANDREW Y	
ART UNIT	**PAPER NUMBER**
2192	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/18/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/734,959	NGAI ET AL.	
	Examiner	Art Unit	
	Andrew Y. Chou	2192	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _____ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *03/15/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-32 have been examined. Claims 1, 19, 24, and 31 are independent claims. The priority date recognized for this application is 12/12/2003.

Information Disclosure Statement

2. The Office acknowledges receipt of the Information Disclosure Statement filed on 03/15/2004. It has been placed in the application file and the information referred to therein has been considered by the examiner.

Oath/Declaration

3. The Office acknowledges receipt of a properly signed oath/declaration filed on 08/02/2006.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Lines 3-4 of claim 1 recites the limitation "at least some of the speculative parallel thread candidates". The limitation "some" is unclear and indefinite.

Claims 2-18 are also rejected under 35 U.S.C 112, second paragraph, because they are dependent on claim 1.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-32 are rejected under 35 U.S.C 102(e) as being anticipated by Nair et al. US 7,146,607 B2 (hereinafter Nair).

Claim 1:

Nair discloses a method of compiling a program comprising:

identifying a set of speculative parallel thread candidates (see for example column 7, lines 31-39, FIG. 2, step 204, and related text) ;

determining cost values for at least some of the speculative parallel thread candidates;

selecting a set of speculative parallel threads from the set of speculative parallel thread candidates based on the cost values (see for example column 7, lines 46-55); and

generating program code based on the set of speculative parallel threads (see for example FIG. 2, and related text).

Claim 2:

Nair further discloses a method as defined in claim 1 wherein identifying the set of

speculative parallel thread candidates comprises identifying program regions (see for example column 7, lines 31-39, "fragments").

Claim 3:

Nair further discloses a method as defined in claim 1 wherein at least one of the speculative parallel thread candidates comprises at least one program region (see for example column 7, lines 31-39, FIG. 2, step 204, and related text).

Claim 4:

Nair further discloses a method as defined in claim 1 wherein at least one of the speculative parallel threads comprises at least one program region (see for example column 7, lines 31-39, FIG. 2, step 204, and related text).

Claim 5:

Nair further discloses a method as defined in claim 1 wherein identifying the set of speculative parallel thread candidates comprises identifying program loops (see for example column 9, lines 29-39, FIG. 3, step 302, and related text).

Claim 6:

Nair further discloses a method as defined in claim 1 wherein at least one of the speculative parallel thread candidates comprises a program loop (see for example column 9, lines 29-39, FIG. 3, step 302, and related text).

Claim 7:

Nair further discloses a method as defined in claim 1 wherein at least one of the speculative parallel threads comprises a program loop (see for example column 9, lines 29-39, FIG. 3, step 302, and related text).

Claim 8:

Nair further discloses a method as defined in claim 1 wherein identifying the set of speculative parallel thread candidates comprises identifying a main thread (see for example column 7, lines 54-59, "dynamic optimizer thread").

Claim 9:

Nair further discloses a method as defined in claim 8 wherein the main thread comprises a current iteration of a program loop, and the speculative parallel thread candidate comprises a next iteration of the same program loop (see for example column 9, lines 40-49).

Claim 10:

Nair further discloses a method as defined in claim 8 wherein the main thread comprises a current iteration of a program loop, and the speculative parallel thread comprises a next iteration of the same program loop (see for example column 9, lines 40-49).

Claim 11:

Nair further discloses a method as defined in claim 1 wherein the cost value is a misspeculation cost (see for example column 7, lines 46-55).

Claim 12:

Nair further discloses a method as defined in claim 11 wherein determining the misspeculation cost comprises:

identifying a data dependency in the speculative parallel thread candidate (see for example FIG. 4 and related text);

determining, for the data dependency, a likelihood that a dependency violation will occur; and determining an amount of computation required to recover from the data dependency violation (see for example FIG. 4, and related text).

Claim 13:

Nair further discloses a method as defined in claim 1 further comprising determining at least one of the following for at least one of the speculative parallel thread candidates: a size of the speculative parallel thread candidate; and a likelihood representative of the speculative parallel thread candidate (see for example column 7, lines 45-54).

Claim 14:

Nair further discloses a method as defined in claim 1 wherein at least one of the speculative parallel thread candidates is transformed prior to determining the cost value for the at least one of the speculative parallel thread candidates (see for example FIG. 4, and related text).

Claim 15:

Nair further discloses a method as defined in claim 14 wherein the at least one of the speculative parallel thread candidates is transformed by a code reordering (see for example FIG. 3, steps 312, and related text).

Claim 16:

Nair further discloses a method as defined in claim 14 further comprising determining at least one of the following for at least one of the speculative parallel thread candidates: a size of the speculative parallel thread candidate (see for example column 7, lines 45-54);

a likelihood representative of the speculative parallel thread candidate (see for example column 7m lines 45-54); and

a description of the transformation performed on the speculative parallel thread candidate (see for example FIG. 3, step 302, and related text).

Claim 17:

Nair further discloses a method as defined in claim 1 wherein at least one of the speculative parallel threads is transformed prior to code generation (see for example FIG. 3, step 312, and related text).

Claim 18:

Nair further discloses a method as described in claim 17 wherein the at least one of the speculative parallel threads is transformed by code reordering (see for example FIG. 4, and related text).

Claim 19:

This is the article version of the claimed method discussed above (Claim 1), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Nair.

Claim 20:

This is the article version of the claimed method discussed above (Claim 11), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Nair.

Claim 21:

This is the article version of the claimed method discussed above (Claim 12), wherein

all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Nair.

Claim 22:

This is the article version of the claimed method discussed above (Claim 13), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Nair.

Claim 23:

This is the article version of the claimed method discussed above (Claim 14), wherein all claim limitations have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Nair.

Claim 24:

Nair discloses an apparatus (see for example FIG. 2, and related text) to compile a program comprising:

a candidate identifier to identify a set of speculative parallel thread candidates (see for example FIG. 2, item 205, and related text);

a metric estimator to determine a cost value for at least one of the speculative parallel thread candidates (see for example FIG. 2, item 204, and related text);

a speculative parallel thread selector to select a set of speculative parallel threads from the set of speculative parallel thread candidates based on the cost values (see for example FIG. 2, item 202, and related text); and

a code generator to generate program code based on the set of speculative parallel threads (see for example FIG. 2, item 207, and related text).

Claim 25:

Nair further discloses a apparatus as defined in claim 24 wherein the candidate identifier comprises a region identifier to identify program regions (see for example Fig. 2, item 204, and related text).

Claim 26:

Nair further discloses a apparatus as defined in claim 24 wherein the candidate identifier comprises a loop identifier to identify program loops (see for example Fig. 2, item 204, and related text).

Claim 27:

Nair further discloses a apparatus as defined in claim 24 wherein the candidate identifier comprises a candidate selector to select a first one of a program region and a program loop iteration to execute in a main thread, and to select a second one of a program region and a program loop iteration to execute in a speculative parallel thread (see for example column 9, lines 29-39, FIG. 3, step 302, and related text).

Claim 28:

Nair further discloses a apparatus as defined in claim 24 wherein the metric estimator determines a misspeculation cost (see for example column 7, lines 46-55).

Claim 29:

Nair further discloses a apparatus as defined in claim 24 wherein the metric estimator comprises:

a data dependency identifier to identify a data dependency in the speculative parallel thread candidate (see for example FIG. 4 and related text);

a likelihood evaluator to determine a likelihood that a dependency violation will occur; and a recovery size calculator to determine an amount of computation required to recover from the data dependency violation (see for example FIG. 4 and related text).

Claim 30:

Nair further discloses an apparatus as defined in claim 24 wherein the candidate identifier determines at least one of the following for at least one of the speculative parallel thread candidates:

a size of the speculative parallel thread candidate; and a likelihood representative of the speculative parallel thread candidate (see for example column 8, lines 9-19).

Claim 31:

Nair discloses a system (see for example FIG. 1, and related text) to compile a program comprising:

a candidate identifier to identify a set of speculative parallel thread candidates (see for example FIG. 2, item 205, and related text);

a metric estimator to determine a cost value for at least one of the speculative parallel thread candidates (see for example FIG. 2, item 204, and related text);

a speculative parallel thread selector to select a set of speculative parallel threads from the set of speculative parallel thread candidates based on the cost values (see for example FIG. 2, item 202, and related text); and

a code generator to generate program code based on the set of speculative parallel threads; and a static random access memory to store the cost values (see for example FIG. 2, item 207, and related text).

Claim 32:

Nair further discloses a system as define in claim 31 wherein the metric estimator comprises:

a data dependency identifier to identify a data value dependency in the speculative parallel thread candidate (see for example FIG. 4 and related text);

a likelihood evaluator to determine a likelihood that a dependency violation will occur; and a recovery size calculator to determine a set of recovery computation sizes that represent an amount of computation required to recover from the data dependency violation (see for example FIG. 4 and related text).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Y. Chou whose telephone number is (571) 272-6829. The examiner can normally be reached on Monday-Friday, 8:00 am – 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam, can be reached on (571) 272-3695.

The fax phone number for the organization where this application or proceeding is assigned is (571) 273 8300.

Any inquiry of a general nature of relating to the status of this application or proceeding should be directed tot eh TC 2100 Group receptionist whose telephone number is (571) 272 2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

AYC

TUAN DAM
SUPERVISORY PATENT EXAMINER